Observation of Age Peculiarities Teaching Mathematics to Part – Time Students

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***Abstract* – The article analyses certain aspects of teaching calculus at the university, especially in the groups comprising students of different age , who have had a break in the learning process, considering their motivation and readiness to study at the university. In order to achieve good results in math, it is vitally necessary to work out new methods of teaching and testing. Henceforth, it is necessary to change the teaching style from authoritarian to cooperative style. Closer cooperation among secondary school teachers and university lecturers should be established and promoted to achieve purposeful, gradual, and successful approach to the teaching process.**

***Keywords* – mathematics, the study of mathematics at higher educational institutions, learning style, adult education, educational processes.**

I. Introduction

Studies of mathematic at Riga Technical University, Latvia, are implemented within full-time and part-time study programs. The main difference between the part-time and full-time study programs is that the former are often attended by students of different age and with different level of prior knowledge, many of whom have had a study break.

II. Educational Styles with Regards to Age Peculiarities

In the research papers of R. J. Havighurst [1] on the relationship between the stage of human life and educational needs, the following development tasks have been defined:

- in the age from 18 to 30 years education is connected with career opportunities and selecting an occupation;
- in the age from 30 to 40 years education is an additional field of self-realization and self-development;
- in the age from 40 to 50 years a person demonstrates his/her own firmness and conviction;
- after the age of 50 years a person chooses such educational courses, which promote analytical skills, meditation and appraising.

Four methods are used in the process of teaching mathematics:

1) work in groups on projects to get information independently in the processes of referencing, comprehension and exchange;
2) frontal teaching – to lay out the prepared information at the lectures;
3) cooperation (of pairs, partners, groups);
4) individual work aimed at training of abilities and skills, peer assessment and self-assessment

III. Changing Approach to Teaching Mathematics to Adults

Nowadays, more and more frequently the concept „educational institution" is replaced by the concept „society that learns". Basic concepts of pedagogy, such as *education*, *learning*, *knowledge* and *skills* acquire new meaning. Today learning means getting new knowledge and skills in order to go hand in hand with the demands and needs of the changing world, so nowadays the notion 'basic skills' covers a wider scope of meaning. At present such traditional skills as reading, writing, speaking and doing sums are supplemented with information and communication technologies, foreign languages, business skills and social skills (self-study skills and other). These changes ensure the continuity of life-long learning. Learning occurs not only at school, but also

- at the working place, in the professional environment, where new knowledge and skills are immediately put into practice,
- at home and at social events, developing understanding about topical issues in the society, thus enhancing the experience of social communication.

In such a way, learning is not only an activity spared for pupils and students, it also becomes a basic need for people taking on different social roles and functions, as well as for people of different ages. A modern person understands that learning ensures the opportunity to improve the quality of life and work. P. Jarvis emphasizes that reflexive learning is a typical feature of modern times. The teachers should realize that today the stress is shifted from the acquisition of knowledge in different subjects to expressing oneself, self-actualization, as well as to acquisition of communication skills. Language learning, development of evaluation and self-evaluation skills, as well as ability to cooperate with others, explore and search for untraditional solutions become a priority.

In order to efficiently motivate adults to study, some essential regularities of adult education should be taken into account:

1. student's self-actualization is ensured in the study process and their experience to think and read independently is built;
2. critical reflection is pointed out, and it is based on the following processes:
    - the methods used;
    - direct, alternative, presupposed ideas, activities and opinions.

The necessity of life-long education changes the emphasis of the educational processes at schools. It ascribes even

more importance to self-education. The course that promotes development of the following self-reliant study skills must be included in all study programs. It should help the student develop the skills:

- to control one's own study processes by developing skills, to set targets independently;
- to analyze problems and issues.

A part-time student receives education at the same time performing work responsibilities and meeting family commitments. Such students are not always psychologically ready to repeatedly start intense study work, they have strong assumptions concerning their abilities and knowledge, which often to do not reflect the actual situation. The primary task of the pedagogue is to convince the students that they have ample opportunities for progress and to provide the necessary knowledge about the study work in general.

The pedagogue should create an eligible syllabus and select appropriate teaching methods for each group, making sure that the stress is made on cooperation, positive motivation and perspective. Adult's personality and chosen aims must be taken into consideration in the process of communication. Stability or weakening of the memory in the course of person's life cannot be disregarded.

Study materials for part-time students should cover a wider scope of themes to be revised than it is necessary for full-time studies. It is advisable to visualize study materials to the utmost, giving students a chance to access the materials both in general and in details. Along with the examples of problem-solving solutions, theoretical foundations and explanations must be provided.

Adult psychology requires a precisely worked out evaluation system that leaves no chance for subjectivity. Assessment criteria must be discussed in advance and accurately observed.

The student, who starts studies on the part-time basis immediately after the secondary school and has the opportunity to attend all classes, wants to work in the mode they got used to in the secondary school – they expect to receive explanations from the lecturer, to study within a lasting study period when all students are involved, they expect that at the classes enough time is spent for solving the tasks making notes on the board, and at the end of each practical class tasks to be solved individually at home are given. In their view, academic achievements should be assessed for each minor theme and these marks should influence the final results. In the course of such study process, every new theme is based on the previously acquired knowledge and skills, and a new topic can be introduced quite briefly.

The student, who restarts studies after a break, wants a longer revision course both in general and on introduction of every new theme, because 'new theme' in his or her understanding is rarely connected with the known or acquired previously. The break in studies has left its influence not only on the actual knowledge, but also on the student's assumptions about it, skills of making intellectual effort are also forgotten, that is why a certain part of a lecture or practical class is spent on assuring that every work can be done, if you do it.

The student, who combines studies with work and is able to attend only a certain part of the available classes, wants to get brief and specific information, their attitude towards the tasks to be completed at home is negative, at the same time they want to receive materials that are suitable for independent work – concise, understandable, supplemented with task solution examples and case studies. In their understanding, the lecturer must work as a consultant, taking into account individual needs of every student. Tests should not be too frequent and should be conducted in the time adjusted to the student's work schedule.

The student at the age above twenty has gained certain life experience, their attitude towards studies is more serious; it is mainly aimed at gaining real knowledge and is more determined.

Study aims can be connected with the choice of profession, willingness to earn more, to self-actualize in creative work, to broaden the horizons, to keep up with friends and peers.

The lecturer must not only be knowledgeable but also be able to organize lectures in such a way that the students do not get bored and do not lose their attention. Nowadays pedagogy believes that the main aspect is interaction which includes psychological and practical preparation for an activity, implementation of the activity and its evaluation. The skills of the pedagogue lie in the ability to choose such teaching methods that promote students' willingness to act and create positive atmosphere in the study process. In the transition process methods used by the pedagogue are more essential than the study program and textbooks, because a newly developed program, textbook or computer software does not promote the quality of education if the pedagogue does not have the necessary skills to use them. The main problems for the candidates are posed by the necessity to comprehensively review the material, that is why it is necessary to use consumable visual aids and promote positive cooperative atmosphere. It would promote students' aspiration for cognition and interest in obtaining positive results. Great attention should be paid to using visual aids to facilitate the revision process for the participants of the course. I personally allow using so called „*portfolios*" during the course, where each student can find the necessary information nicely put in order.

The second type of study aids that helps organize and memorize information is „mind maps". Mind map, as E. Smith states, „activates the ability of brain to reproduce and find a relationship" [5]. The main topic is put in the centre; dependent concepts are put around it, and other dependent themes are placed around them. „Clear, significant visual image must be found for the basic topic and the dependent concepts. Connected lines, arrows and interrupted lines should be used in the mind maps..." [5]. Unusual layout helps activate students' attention.

Another way that helps to prepare an acceptable visual aid is „graphic organizers" – it is a visual representation of concepts, knowledge and information with the help of

various graphic elements. In the book „Bilingual education: manual for teachers" L. Holmes et al discuss the following features of graphic organizers:

- Stress the main or the key elements.
- Integration of previous or new knowledge.
- Promotion of planning.
- Development of study skills (analysis, synthesis).
- Creation of concepts and ideas [4].

The ability of the pedagogue to be near not above the students is of great importance, because every student has a field where he or she is stronger and more knowledgeable than others.

While explaining the process of solving the tasks or certain theoretical issues, the pedagogue must try not to become a lecturer, and not to congest the language with smart terms, but use associations and free atmosphere, however, it cannot turn into familiarity.

The ability to motivate the candidates for active study work also depends on the correct distance.

One of the main preconditions for reaching successful learning outcomes is solving questions of communication correctly. The pedagogue must be flexible and be able to effectively combine teaching methods, as well as have personal interest in academic achievements of every student.

Both cooperative method and individual work are used in the classes, self-assessment skills are developed. Students show great enthusiasm during the classes, they ask questions, because they are interested in acquiring and improving the knowledge of mathematics.

New environment and a definite aim, i.e. to use the knowledge of mathematics in the real life, help raise student motivation and promote independence and readiness to put all the effort to solve the tasks.

Attention should be also paid to one more aspect – inadequate basic knowledge of the students in elementary mathematics. This problem is also important because there will be difficulties in the acquisition of a new course, at times it will be not even possible without the knowledge of the previous course.

First year students of Riga Technical University are offered a test in elementary mathematics at the beginning of every academic year. The test consists only from the questions that are necessary to acquire calculus. Clear tendency is visible in the recent years – the number of students with insufficient basic knowledge is increasing. Great problems with knowledge and skills in elementary mathematics are observed among the part-time students in particular.

The results of the test allow concluding:

1. Basic knowledge of elementary mathematics for students of RTU is quite insufficient. Partly it is attested in the analysis of the students dismissed from Riga Technical University. It is particularly topical at the faculties where students are enrolled without contest or where the competition for state budget funded study positions is very little.
2. The difference between secondary school grades and real knowledge is noticeable.

IV. Conclusions

1. Universities must consider the opportunities to revise the syllabus of the school curriculum on mathematics. New methods and approaches must be developed. Teacher's authoritarianism and the use of traditional teaching methods are common at schools. The relationship between the teacher and students must inevitably change considering the democratic processes undergoing in the society. The learning process should be viewed from the positions of students - teacher interaction.

2. Students who want to enter the university must be really ready to study mathematics. Only purposeful, gradual and continuous approach to the learning process can be productive.

3. Pedagogues and teachers should thoroughly prepare for the tests and lectures. Knowledge evaluation must be more considerate. For example, when analyzing test results a conclusion was drawn that students did not know trigonometry. Perhaps, tests should be organized differently. If a student does not know the values of this particular trigonometric function, it is possible he or she knows the answers to other questions connected with this theme.

4. Cooperation between secondary school teachers and university lecturers must be promoted. New educational environment should be created, where pupil- future student is in the center. It is a complicated process because it is connected with the changes in the human thinking.

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